Tracking and Data Acquisition

Agenda

- Potential Use of TDRSS for Range Safety
- Concept of TDRSS Range Safety
- TDRSS Conceptual Coverage Diagram
- Current Range Safety Requirements
- SN Time Delay
- TDRSS Conceptual Support Capabilities
- Advantages of SN Support Services
- Challenges in Using TDRSS
- TDRSS Compatible Products
- Conclusion/Summary

Potential Use of TDRSS for Range Safety

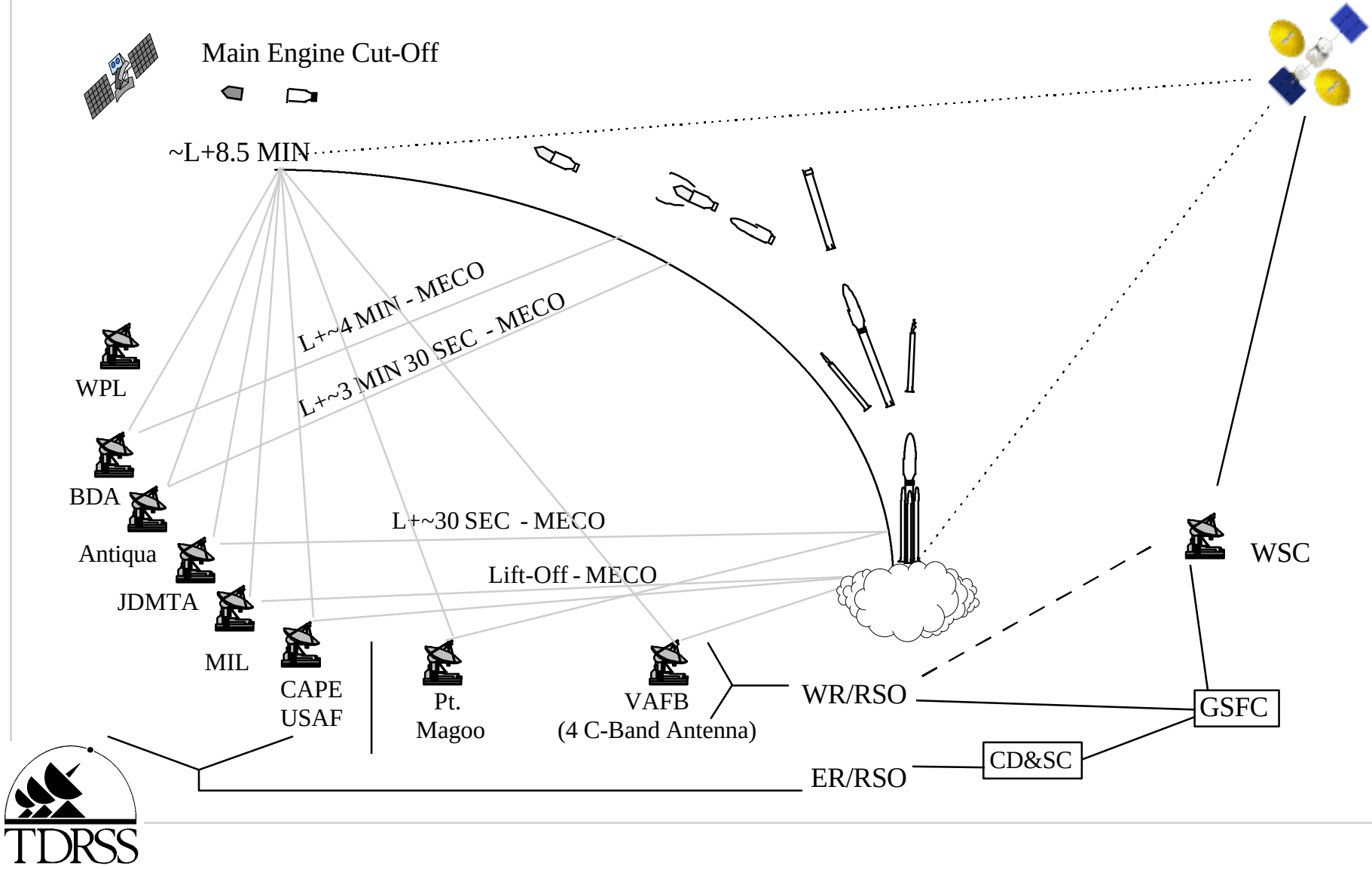
Today's changing technical and fiscal environment requires NASA to assess and reengineer its customer support capabilities and processes:

- Cost of the current systems/methods
- Doing more with less
- Closing of NASA Ground Stations
- NASA and DOD Budget Constraints
- Technological Advancements
- Maintaining Safety

Concept of TDRSS Range Safety

- Continuous coverage of All Launch Phases
- Tracking and Data Acquisition
- Additional and/or Contingency Coverage
- S-Band Commanding (Potentially)

TDRSS Conceptual Coverage Diagram

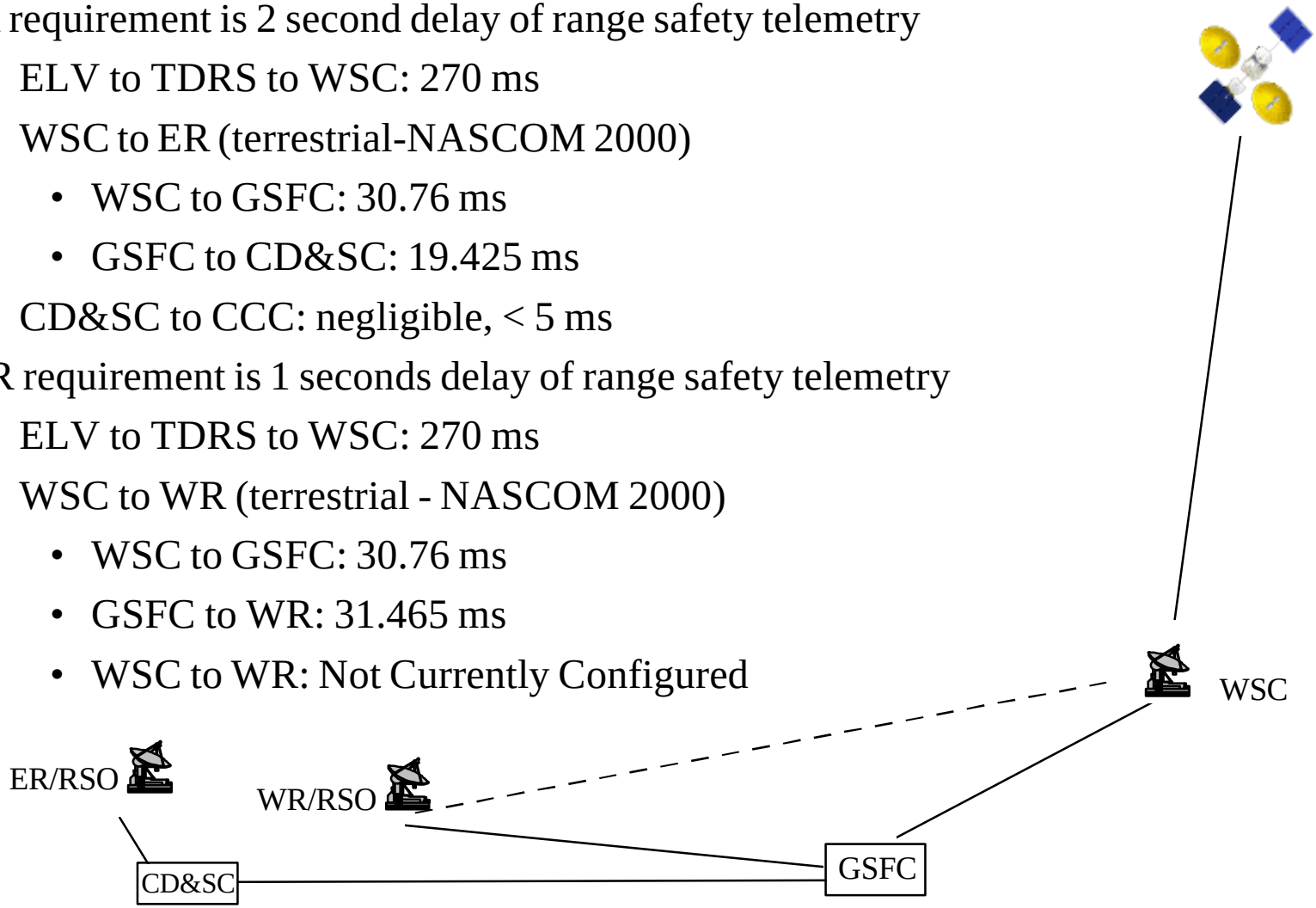


Current Range Safety Requirements

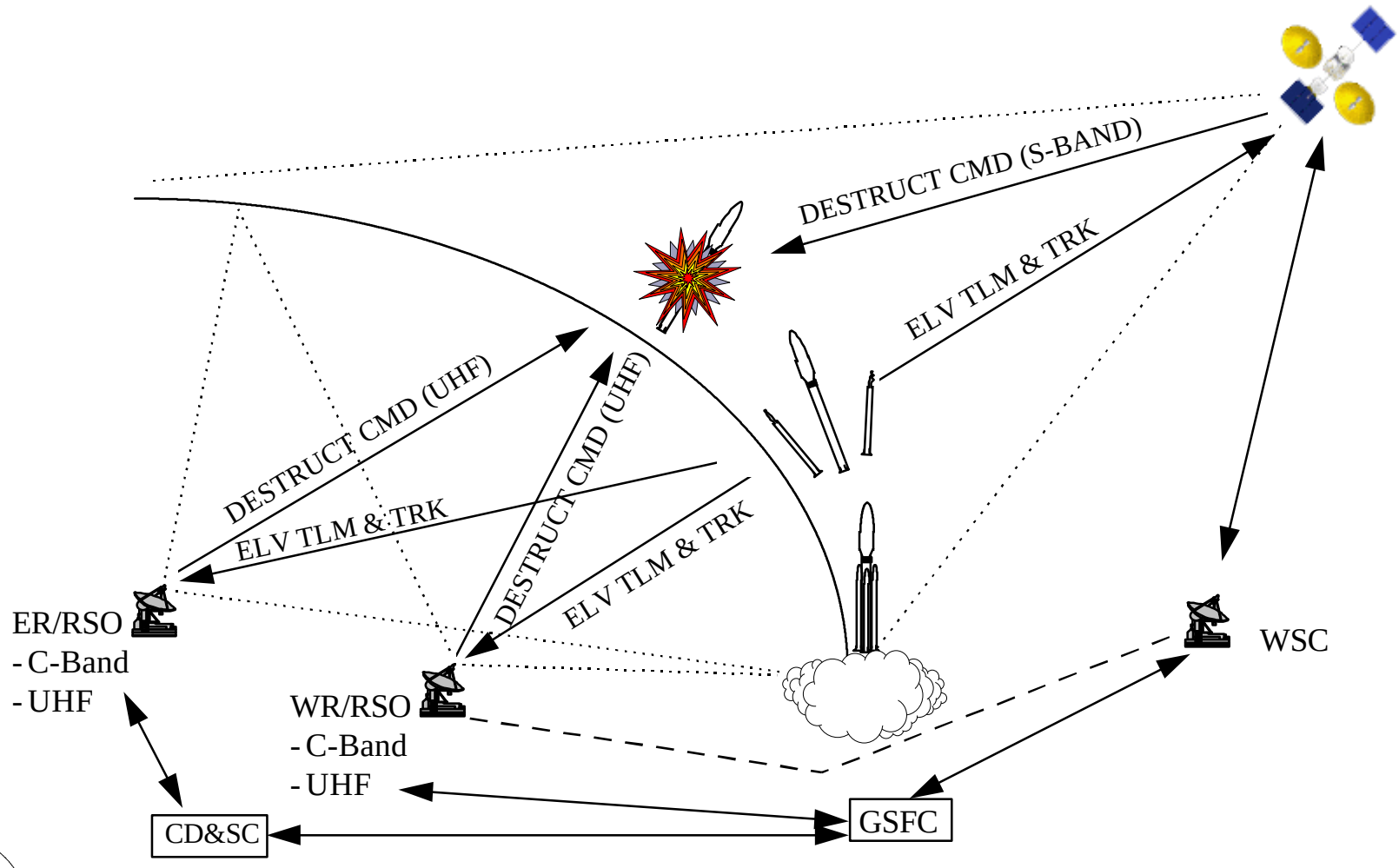
- Tracking
  - From Initial Observation to RSO Computers: 400 msec
- Telemetry Latency Requirements
  - Eastern Range
    - » Two second delay requirement
  - Western Range
    - » One second delay requirement

SN Time Delay

- ER requirement is 2 second delay of range safety telemetry
  - ELV to TDRS to WSC: 270 ms
  - WSC to ER (terrestrial-NASCOM 2000)
    - WSC to GSFC: 30.76 ms
    - GSFC to CD&SC: 19.425 ms
  - CD&SC to CCC: negligible, < 5 ms
- WR requirement is 1 seconds delay of range safety telemetry
  - ELV to TDRS to WSC: 270 ms
  - WSC to WR (terrestrial - NASCOM 2000)
    - WSC to GSFC: 30.76 ms
    - GSFC to WR: 31.465 ms
    - WSC to WR: Not Currently Configured



TDRSS Conceptual Support Capabilities



TDRSS

Advantages of SN Support Services

- Space-borne Platform
  - Ready Asset,
  - High Coverage Area
- Quick Drop Lock Reacq Time
- Redundant Paths (Ground)
- Low Maintenance & Operations Cost

Challenges in Using TDRSS

- ELV Systems would require modifications
- Demodulation of TDRS downlink stream for range safety parameters
- Single TDRS Support
- Backup requirements
- Tracking data requirement 400 msec (potential) (ELV -->SN-->RSO Computers)

TDRSS Compatible Product

- Cincinnati Electronics is Working on a System that could Provide Secure Range Safety via TDRSS.

Anticipated Performance Characteristics:

  - Acceptable Signal Acquisition Time
  - Positive Link Margins - Using Current Vehicle S-Band Antenna
  - Immunity to Jamming Capability
  - Secure Command PN Sequence Selection

Conclusion/Summary

- Introduce the Concept of Range Safety via TDRSS
- Proceed as a Contingency Concept to Range Safety
- Already providing Telemetry Services
- Investigating Methods to Provide Command and Tracking Services